



Remote Automatic Meter Reading System with Instant Billing for MSEB

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Abstract

An RAMR (Remote Automatic Meter Reading) system is used to automatically collect data from various meters located in different area. In this paper we design and implement a Wireless Automatic Meter Reading System to solve the problem in existing AMR (Automatic Meter Reading) system. The system consists of wireless modules, transmitters, receivers, measure meters and management center (as a server). We describes a system framework including the hardware of wireless module and software design of data acquisition. We also develop the operator interface on management center. Finally, we build up a Wireless Automatic voltage Meter Reading System as a case study. The proposed system has board application foreground in industry. Because of the traditional way of metering error and low efficiency, so we have propose household metering system design using 89C51 as the microcontroller and RF as a Radio Frequency channel between Transmitter and Receiver chip as close communication function, using RS232 act as a interface between Receiver and Server. Clustering structure of the network to reduce Energy- saving sleep cycle, data traffic has been achieved. An experiment proves that this system is safe.

Keywords: RAMR (Remote Automatic Meter Reading) System, RF (Radio Frequency), IC(Integrated Circuit), EMC(Energy Meter Controller).

1. Introduction

Energy meter reading is a tedious and an expensive affair. The MSEB meter reader person has to go and take the reading manually to issue the bill, which will later provide to generate bill in the software and payment computation system. It has reduced the laborious task and financial wastage if can automate the manual meter reading process and bill data entry process. This proposes a new network communication system for energy meter reading by integrating communication technology and software system along with the existing meters system. A wired or wireless communication system will be integrated with electronic energy meter to have remote access over the usage of electricity. Energy meter deliver the reading details as on when it demands by the communication system. If any consumer did not pay the bill then the operators needs to go their houses and disconnect the energy power supply. This drawbacks overcome by RAMR system. The collaboration system is further connected with a base station. The communication channel is identified by the consumer's number and it is secured by any cryptographic techniques.

2. RAMR Architecture

A new network communication system for energy meter reading by integrating communication technology and software system along with the existing meters. Every Energy consumption meter will be attached to a microcontroller unit that will scan the meter reading after every one month. The meter reading will transmitted wirelessly to the local server along with the unique meter_id. This data will be processed by the main server for generating the electricity bill automatically.

2.1 Product Perspective

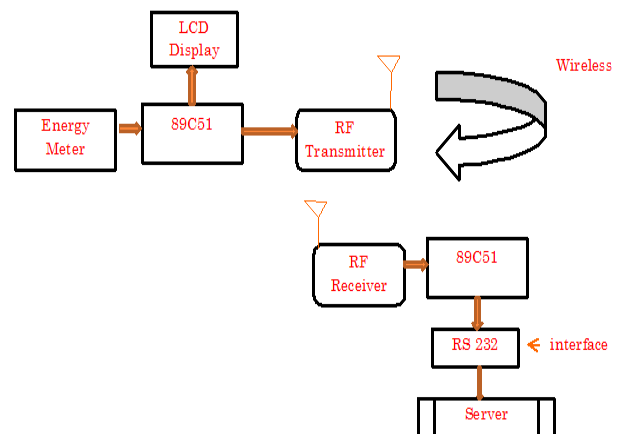


Figure 1: System Architecture

Once the electricity bill is generated an SMS alert will be send to the owner's mobile number which is registered already. The communication channel is identified by the consumer's. Base office can verify the energy meters performance by checking the day to day consumption of energy. Help to avoid any tampering or break down of energy meter.

The main goal of system is to send periodical readings of an electricity meter wirelessly to a server in the billing office of the electricity supply company. There were central point's covering each geographical area, so that each premises unit would have limited range of wireless coverage, while the central points would have long-range wireless transmitters that could deliver the meter-reading data over long distances to the billing office. The main server in the billing office had a highly secure database system which enabled authorized staff members of the electricity supply company to read and print electricity meter bills. For premises out of the coverage area of any central point, the solution proposed is to make the nearest premises unit as the central point for such remote premises. That added constraints on the wireless devices used for the purpose because such a device should be capable for both sending and receiving the information.

2.2 Product Functions

Server side Design, Web Site Design ,Calculation of Meter Reading ,Transfer Meter Reading, Send and receive Meter Reading Using RF transmitter and receiver respectively, Calculate payment using number of units,GenerateBill,Send SMS Alert.

2.3 User Characteristics

2.3.1 Administrator

Maintains the database which contains meter information,user information Administration area secured with user name and password defined, ManageUser Information,Manage Meter Information,CalculatePayment, Generate Bill.

2.3.2 Client

Login to system using user name and password,ViewAlert,ViewBill, Update Personal Information,Pay Bill.

3. Detailed Design

This RAMR energy meter system is constructed using the microcontroller 89C51 chip. The detailed design of this system shown in Fig.2 which consists of main modules as Metering module, network, remote station and user for the interaction. MSEB meter is used to display the reading with number of units and respective stations. We used 89C51 microcontroller. It is 8-bit microcontroller used for arithmetic operations. RF-Transmitter will send captured data from meter to RF-Receiver through wireless network. The interaction between server and microcontroller for serial communication we used RS232 cable.

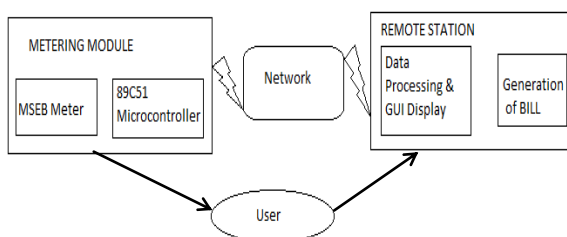


Figure 2: Design Blocks

The received data is processed at server site in bill generation section. User can directly know the amount of bill which is to be pay and can able to pay online. The design of RAMR system can be defined in two categories, Hardware design and Software web design.

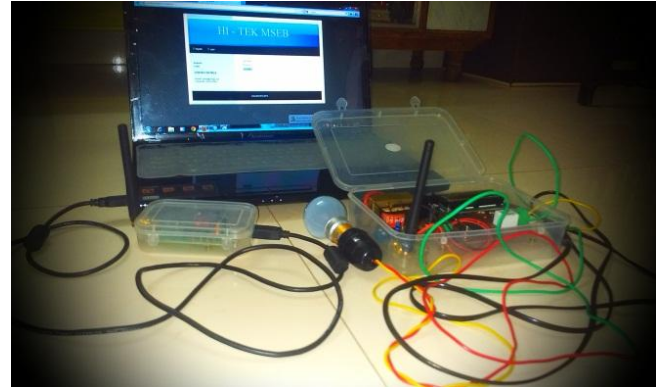


Figure 3: Hardware Detailed Design

Above Figure 3 represent the different hardware which are used for designing the RAMR system that are microcontroller(89C51),RF Transmitter, RF Receiver, LCD Display, Heat Sink and so on.

The Microcontroller is programmed to read information from the referring IC every second. When microcontroller reads the power consumption from the metering IC, it is stored that reading and current reading is incremented in it's software.

4. Hardware Detailed Design



Figure 4:Hardware Design

This RAMR system is constructed by using microcontroller chip i.e. 89C51 and also in this RF

Receiver and RF Transmitter is also used for sending and receiving the billing information.

In this system 2 wire power supply is connected to energy meter. The microcontroller and other devices get power supply from AC to DC. In Figure 4, we used transformer which converts the 230V (5Hz) AC into 5V DC with the help of rectifier. Circuit details are shown in Figure 4.



Figure 5: Sample results on display screen

Above Figure 5, represent the sample reading of RAMR system. In this Figure 5 represent the 16X2 LCD display is there on the top of the meter to display the meter reading and station number. Which represent the max 16 digits reading on display screen easily.

5. Software Detailed Design

5.1 Billing Software

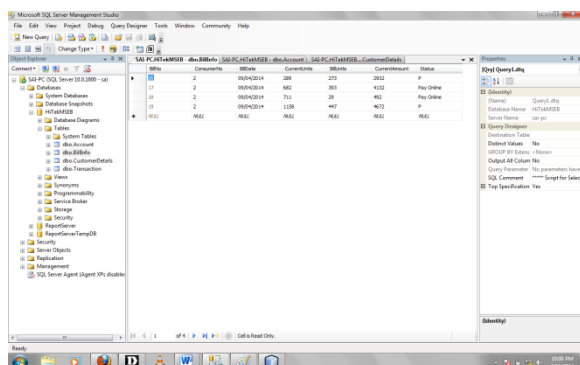


Figure 6: Database Details

Microsoft SQL server 2008 is used to develop the web portal (application). For storing the results means billing information we used the database. Database is constructed with the help of Microsoft SQL server 2008.

In RAMR system database contains the consumer details, billing information and also store the records about performed transaction. Database is important thing for storing the data related to RAMR system.



Figure 7: Home page

NetBeans IDE 7.3.1 provide an integrated development environment (IDE) for maximizing developer productivity with the .NET framework. NetBean is used to develop console and graphical user interface applications along with windows forms applications, web sites, web application and web services.

Above Figure 7, shows the home page designed of the web portal. This web portal contains the Admin and user login with security. Each user having own password for accessing the his/her account. By using web application user can see the his/her personal information, billing information and also paid the online payment.

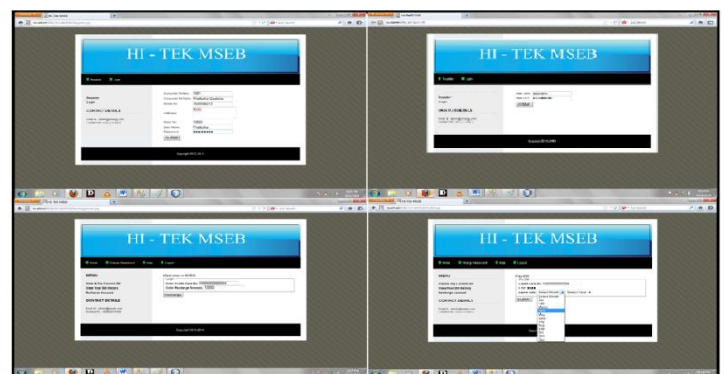


Figure 8: User Login, Registration, Recharge account, pay bill

Users are categorized as Administrator and consumer. In this web application n number of

user can easily login. For creating the consumers account on Hi-Tek MSEB web application, consumer's provide the registration option. After registration particular consumer can access the Hi-Tech MSEB application with his/her log_id and password.

Above Figure 8, represent the how to do the consumer Login, how to pay online bill, Registration, Recharge account.

6. Results

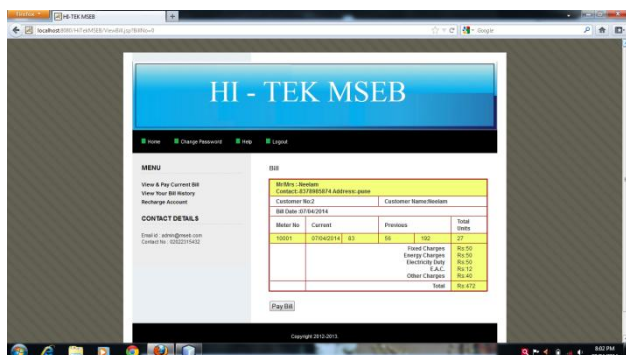


Figure 9: Generate Bill

Above Figure 9, represent the Hi-Tech MSEB web application. This application represents the format of electricity bill and also on this page online payment billing option is presented.

This web page contain the consumer name, his address, contact number, current and previous meter reading, total payable amount, meter number.



Figure 10: Customer registration

RAMR systems, web application has customer/consumer registration option. For doing

the registration on Hi-Tek MSEB web application customers fill his/her personal information in detail. After entering the customer detail information submit that information after pressing submit button that information is stored into the database and after storing customer information into the database, now customer has his own account on Hi-Tek MSEB web application.

7. Conclusion

The remote automatic meter reading system (RAMRS) presented in this paper absorbed many advanced study results in communication and computer technology. The meter-reading job can be finished at the management department of residence area by using this RAMR system. Through study and analysis, the wireless remote meter-reading system is designed. It is using 89C51 as important microcontroller, by RF Transmitter & RF Receiver to do communication in short distance, using RS-232 link communication joint to connect the communication between meter and Management Center i.e. Server.

RAMR as a way of improving customer service while reducing the cost of reading the energy meters. The Automatic Meter Reading System enables us (users) to save millions of dollars every year in meter reading costs and also provide our customers with better information about more correct billings, and keep cost as low as we can.

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